

# REMEDIAL ACTION REPORT

Bonneville Power Administration's  
Ross Complex  
Vancouver, Washington

Operable Unit B: Fog Chamber Dump  
April 1995



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## REMEDIAL ACTION REPORT

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BPA Ross Complex  
Vancouver, WA  
Clark County

### 1. *Introduction*

The purpose of this report is to document that the Bonneville Power Administration (BPA) has completed all construction activities for the long term remedial action for all waste units in Operable Unit B, principally the Fog Chamber Dump Trench Area 1. The remedial actions selected were presented in the Record of Decision (ROD) signed by BPA, the Environmental Protection Agency (EPA) and Washington State Department of Ecology (WDOE), in September 1993. As specified in the ROD, the chosen remedies include the installation of a Minimum Functional Standard (MFS) cap or cover over the Fog Chamber Dump Trench Area 1 along with institutional controls that consist of a security fence and signs that restrict public access. Land use restrictions were also established to ensure the long term maintenance of the containment measures. Capping the dump was selected as a remedy because its design provides for the protection of human health and the environment by eliminating the potential for contact and because it minimizes surface water infiltration that could otherwise lead to groundwater contamination. The installation of the cap was completed on 10/03/94. Installation of a security fence was completed on 10/19/94.

At an adjacent area, Fog Chamber Dump Trench Area 2, elevated concentrations of lead and other metals were found in association with buried solid wastes such as wires and lead-coated cables. Because this contamination is in isolated locations and is below the surface, it was determined the area did not pose a risk to human health or the environment through either direct contact or potential groundwater contamination. Nevertheless, institutional controls were imposed to restrict land use activities that might disturb the subsurface contamination.

Several other areas were included in the investigation of Operable Unit B which were not found to present a risk. For this reason no further action was required at the Cold Creek Fill Area or for the surface water and sediments in Cold Creek and Burnt Bridge Creek.

Although no source of groundwater contamination was identified in the investigation, the shallow perched groundwater and the deep aquifer will continue to be monitored for volatile organic compounds.

## 1.1 Site Location & Description

The BPA Ross Complex is an active 250 acre installation located in Clark County Washington. The site is located approximately 2.7 miles north of the Columbia River and 1.7 miles east of Vancouver Lake. The site is bordered to the north by Cold Creek Canyon (Cold Creek), a Burlington Northern Railroad right-of-way, NE Minnehaha Street and to the east & south by a residential neighborhood. Burnt Bridge Creek borders the site to the southwest and west. Highway 99 and Interstate 5 borders the site to the west (Figure 1). The two streams which border the site flow into Vancouver Lake. Vancouver Lake receives recreational use by local residents.

Groundwater, which is obtained from the Troutdale Aquifer, is the primary supply of drinking water in the Vancouver Area. The Troutdale Aquifer is approximately 150 feet below the surface at the site. Drinking water is distributed by Clark Public Utilities and the City of Vancouver who have well fields located both hydraulically upgradient and downgradient of the site. (Refer to Figure 1).

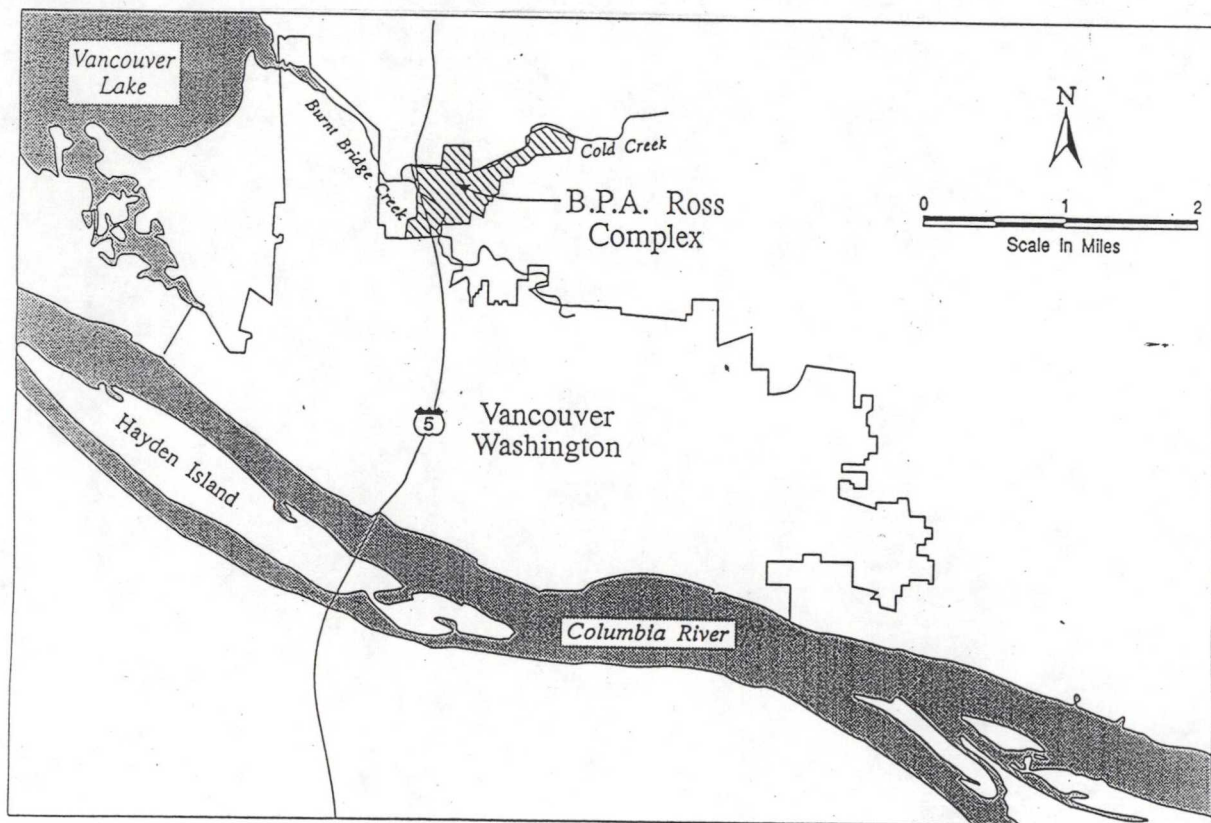


Figure 1. Site Location Map



## 1.2 *History*

The Site is an active facility that has been owned and operated by the BPA since 1939 to coordinate the distribution of hydroelectric power generated by the Federal Columbia River Power System to regions throughout the Pacific Northwest. Since its construction, the Site has provided research and testing facilities, maintenance and construction operations, and waste storage and handling operations for BPA. Maintenance activities at the Ross Complex have routinely involved handling transformer oils containing polychlorinated biphenyls (PCBs), and organic and inorganic compounds associated with the storage of preserved wood transmission poles, paints, solvents, and waste oils. Testing and laboratory activities include the use of heavy metals (such as mercury) and other organic and inorganic compounds.

Five investigations were conducted at the site between 1986 and 1990: a Preliminary Assessment (PA 1986), a Site Investigation (SI 1988), a soil gas survey and ground-water quality assessment (Weston, 1989), a preliminary hydrogeologic investigation (Dames & Moore, 1989), and a Vancouver Well Field Special Survey (E&E, 1990). BPA has also conducted numerous individual sampling programs in various areas of the Site. The findings of these investigations are summarized in detail in the "Remedial Investigation Report, Operable Unit A, Bonneville Power Administration, Ross Complex" dated May 15, 1992 and the "Remedial Investigation Report, Operable Unit B, Bonneville Power Administration, Ross Complex" dated March 19, 1993.

The site was listed on the National Priorities List (NPL) in November 1989 based on the presence of volatile organic compounds (VOCs) in groundwater and the Site's proximity to the City of Vancouver's drinking water supply. As a result of the listing, and pursuant to a Federal Facility Agreement (FFA) signed by BPA, EPA, and WDOE on May 1, 1990, BPA conducted a Remedial Investigation/Feasibility Study (RI/FS) to determine the nature and extent of contamination at the site and to evaluate alternatives for the clean up of contaminated areas. The RI field investigation began in the summer of 1991 and included the collection and chemical analysis of surface and subsurface soil, water, sediment, and groundwater samples.

Initially the RI was designed to address the entire Site but during the summer of 1991, BPA, EPA and WDOE decided that the Site would be divided into two separate operable units (Units A and B) to facilitate the CERCLA process. The Operable Unit B Remedial Investigation focused on characterization of subsurface soils in three areas of concern: the Fog Chamber Dump Trench Areas 1 and 2 and the Cold Creek Fill Area. The investigation also included characterization of the shallow perched water table and deep groundwater aquifer beneath the Site, and surface water and sediment in Cold Creek and Burnt Bridge Creek.

It was determined in the ROD that the remedial action for Operable Unit B would be limited to capping or covering the Fog Chamber Dump, Trench Area 1; the establishment of institutional controls at Fog Chamber Dump, Trench Area 2; and the continued monitoring of volatile organic compounds in the groundwater.

There were no unacceptable risks to human health or the environment associated with the Cold Creek Fill soils, Cold Creek and Burnt Bridge Creek surface water or sediments. For that reason no further action will be taken at these specific locations.

### 1.3 *Components of Selected Remedy*

Field activities in the summer of 1992 completed the site characterization for OUB and included the installation of additional monitoring wells, continued groundwater monitoring and surface water and sediment monitoring in Cold Creek.

The chosen remedy for the Fog Chamber Dump Trench Area 1, i.e. the installation of a permanent cap or cover, has been in place since October 1994. The cap itself consists of a number of layers which constitute an impervious barrier that eliminates the potential for human contact and minimizes surface water infiltration that could lead to groundwater contamination. As illustrated in Figure 2, the actual design of the cap consists of the following:

- Immediately over the wastes, at the base of the cap is a compacted subgrade of 1-1/2 feet of clean fill.
- Over the subgrade is a geosynthetic clay liner (GCL). The GCL is a factory-manufactured hydraulic barrier consisting of a layer of pure sodium bentonite clay encapsulated between two polypropylene geotextile fabrics. The GCL has a low permeability rating of  $5 \times 10^{-9}$  cm/sec.
- Over the GCL is another layer of compacted backfill, the surface of which is designed to provide for a 2% drainage slope.
- Next, a 40 mil high density polyethylene (HDPE) geomembrane liner was installed over the waste unit.
- A 6-inch minimum compacted sand layer was placed on top of the geomembrane liner as a protective barrier.
- Installed above the sand was a 100% polypropylene fabric that will keep surface rock from sinking into the sand.
- A top layer of 5/8-inch minus crushed rock (minimum 4-inch compacted depth) provides a surface for traffic.
- Following the perimeter of the cap in its entirety is a drainage collection system consisting of 6-inch perforated PVC drain pipe that feeds into an oil water separator.
- Finally, the entire waste unit is enclosed by a permanent 7-foot fence with a barbed wire top. The fence is posted inside and out.



# Cross Section of Fog Chamber Cap

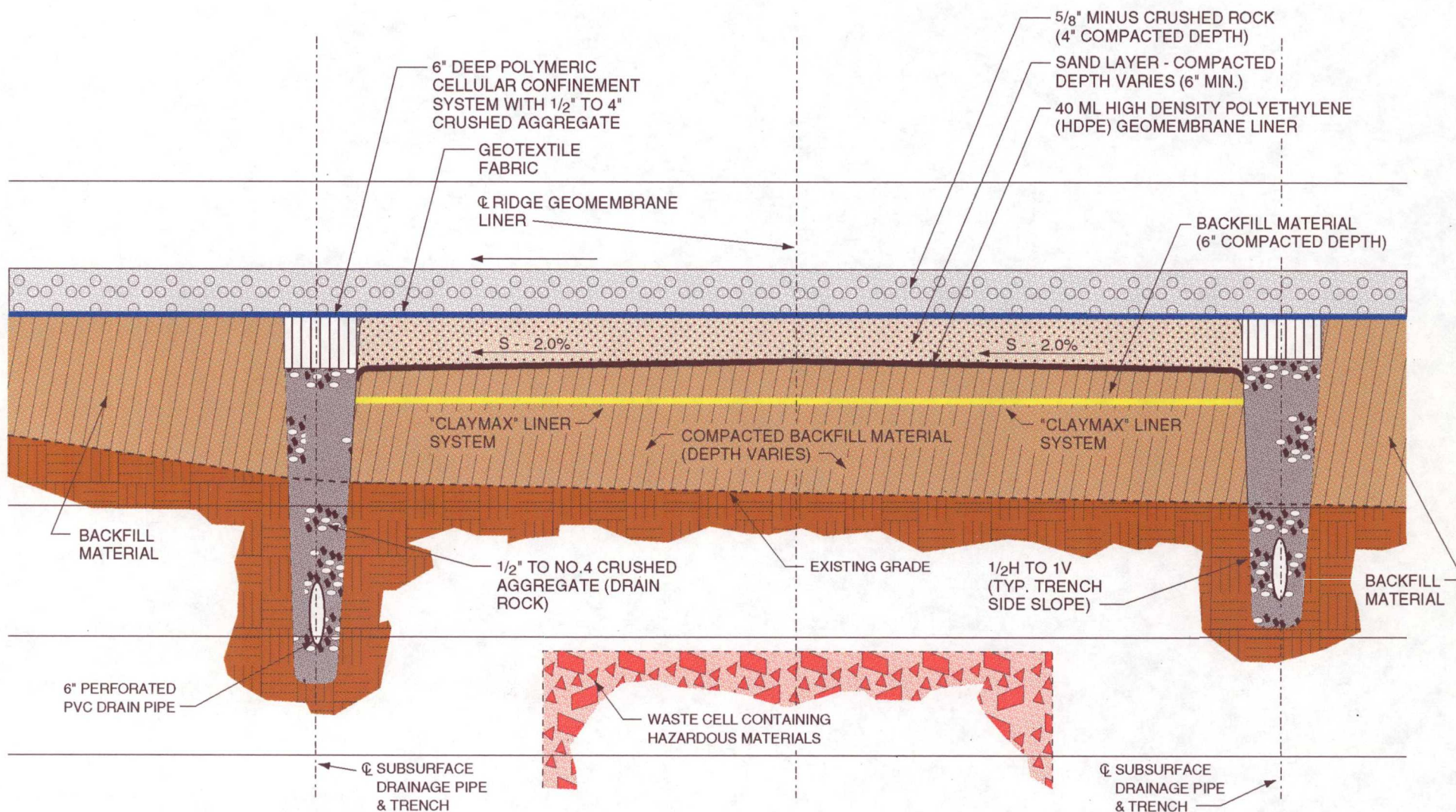


FIGURE 2



## 1.4 *Specific Contaminants Addressed in Record of Decision*

The shallow or perched water tables and the deep aquifer beneath the Ross Complex were tested for a wide range of potential contaminants including volatile organic compounds, pesticides, herbicides, metals, base neutral acids, PCB's, phenols, phthalates and polycyclic aromatic compounds (PAH's). The primary contaminants found in the groundwater were 1,1,1-Trichloroethane (TCA) and 1,1-Dichloroethene (DCE). The maximum concentration for TCA was 82 mg/L found during April 1989 in a shallow groundwater monitoring well (MW-4A). The maximum concentration for DCE was .014 mg/L found in April 1992 in a deep monitoring well (MW-13B), the only deep well to measure an exceedence of drinking water standards.

Soil contaminants of concern in the Fog Chamber Dump Trench Area 1 were found below the surface and include antimony, arsenic copper, lead, zinc, HPAHs and PCBs. The highest values found were for PCBs (30,000 ppm) at eight feet below the surface.

## 2. *Chronology of Events*

The Record of Decision (ROD) for O.U.B. was signed by the Washington State Department of Ecology's (WDOE) Manager for the Toxics Clean-up Program on September 27, 1993 and the U.S. Environmental Protection Agency's (EPA) Regional Administrator and BPA's Ross Complex Site Manager on September 29, 1993.

Draft Remedial Design plans for the Fog Chamber cap or cover were first submitted to EPA and WDOE in March 1994 (60% Design) and in May 1994 (90% Design). Final remedial design plans were submitted and approved in July 1994. A contractor, Wilder Environmental, Inc., was selected to construct the cap on September 2, 1994. Construction began on September 19 and the cap was completed on October 3, 1994. Installation of a seven foot high security fence was completed on October 19, 1994.

As provided for in the ROD, biannual groundwater monitoring events were undertaken in September, 1994 (dry season) and in February, 1995 (wet season).

### 3. *Performance Standards*

#### 3.1 *Fog Chamber Dump Cap*

Based on the Record of Decision and the Feasibility Study (BPA 1993), the selected remedy of capping with institutional controls in the Fog Chamber Dump will comply with the following standards:

- Washington State Model Toxics control Act (Initiative 97) for clean up of hazardous waste sites, Chapter 70.105 RCW, as codified in Chapter 173-340 WAC.
- Washington State Landfill Standards 173-304-460 WAC.
- State of Washington Public Health and Safety Requirement, RCW 70.95.075 for solid waste landfills.
- General emission standards under WAC 173-400-040 for visible emissions, fugitive emissions and emission of air contaminants which are detrimental to persons or property.
- Requirements for the operation of land treatment facilities, WAS 173-303-655.
- CFR 1910, Hazardous Waste Operations.

The goals and objectives of the remedial action at the Fog Chamber Dump are:

- to prevent direct contact with contaminated soil
- to prevent future disturbance of contaminated soil
- to prevent surface water infiltration
- to create an area at the Fog Chamber Dump Trench Area 1 that can be used by BPA for storage of heavy equipment



### 3.2 *Ground Water Monitoring*

As determined in the Remedial Investigation (RI), the residual occurrence of volatile organic compounds in the shallow perched water table and the deep aquifer was not found to constitute either an on-site or off-site risk to human health or the environment. Nevertheless, since a groundwater contaminant source was not identified in the RI, groundwater will continue to be monitored to determine any variability in contaminant concentrations over time. A biannual monitoring program is being followed that provides for groundwater sampling and analysis during the wet and dry seasons. Four key monitoring wells are being sampled and analyzed for TCA, DCE and chloroform. The four monitoring wells are MW-4A, MW-13B, MW-14B, MW-16B.

Table 1 contains groundwater analysis data for two sampling events that have taken place since the ROD for O.U.B. was signed. Laboratory data for the September, 1994 (dry season) and February, 1995 (wet season) are presented along with historical data for those same monitoring well locations and analytes. TCA exceedences in shallow groundwater monitoring well #4A have continued to decline over time and are now below the maximum contaminant level of .2mg/l for drinking water. Monitoring well #13B is the only deep well with an exceedence to drinking water standards. As indicated in Table 1, groundwater conditions at the site are stable.

### 4. *Construction Activities and Construction Quality Control*

The engineering plans and specifications for the installation of the Fog Chamber cap were prepared by BPA's Office of Engineering Services, Facilities Design Branch. The EPA and WDOE reviewed the design plans as part of the 60% Design, the 90% Design with the Final Design plans being submitted in 1994.

Wilder Environmental, a commercial construction firm selected by the competitive bid process, performed the construction. Wilder's qualifications were evident in the fact that they had previously installed or subcontracted over 21 million square feet of flexible liner containment systems including 9 area landfills. The contractor's knowledge and experience allowed the project to proceed without any delays in schedule. No change orders were issued on the project.

### 5. *Final Inspection*

A final inspection was conducted by EPA on October 17, 1994. No deficiencies were noted.



## Round 2

## February 1995 Biannual Groundwater Monitoring

## &amp; Historical Quarterly Volatile Organic Compound &amp; Chromium Results

## BPA Ross Complex

Concentrations expressed in mg/l.			volatile organics				Metals	
			chloroform	1,1,1-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	total chromium	dissolved chromium
MCL			0.1	0.2	NE	0.007	0.1	0.1
MTCA Method B			0.007	0.72	NE	0.00007	0.08	0.08
WA State Ground Water Qual. Criteria			0.007	0.2	0.001	NE	0.05	0.05
<i>Shallow Well</i>								
MW04A	Nov-87		0.002 U	0.152	0.003 U	0.003 U	NA	NA
MW04A	May-88		0.0005 U	0.571	0.002 U	0.078	NA	NA
MW04A	Apr-89		0.0005 U	0.82	0.0001 U	0.0001 U	NA	NA
MW04A	Nov-89		0.025 U	0.46	0.005 U	0.017	NA	NA
MW04A-1	Sep-91		0.0001 U	0.37	0.001	0.018	0.0495 J	0.006 UJ
MW04A-2	Jan-92		0.0002 U	0.28	0.0009	0.014	0.057	0.006 U
MW04A-3	Apr-92		0.0001 U	0.3 J	0.001	0.015	0.0595	0.006 UJ
MW04A-4	Jul-92		0.0001 U	0.21	0.0008	0.014	0.0532	0.006 UJ
MW04A-5	Oct-92		0.0001 U	0.27 J	0.00088	0.014	NA	NA
MW04A-6	Jan-93		0.0001 U	0.24	0.0001U	0.01	NA	NA
MW04A-7	Apr-93		0.00011	0.25	0.00083	0.013	NA	NA
MW04AX-7	Apr-93		0.00012	0.24	0.00081	0.013	NA	NA
MW04A-8	Jul-93		0.00014	0.19	0.001	0.013	NA	NA
MW04AX-8	Jul-93		0.00013	0.21	0.00099	0.013	NA	NA
MW04A	Sep-94		0.0001 U	0.14	0.0005	0.009	0.084	NA
MW04A	Feb-95		0.0001 U	0.13	0.0001 U	0.007	NA	0.01 U
<i>Background Well</i>								
MW17B-1	Sep-91		0.0001 U	0.0001 U	0.0001 U	0.0002 U	0.006 UJ	0.006 UJ
MW17B-2	Jan-92		0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0108	0.006 U
MW17B-3	Apr-92		0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.006 UJ	0.006 UJ
MW17B-4	Jul-92		0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.0073 J	0.006 UJ
MW17B-5	Oct-92		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	NA
MW17B-6	Jan-93		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	NA
MW17B-7	Apr-93		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	NA
MW17B-8	Jul-93		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	NA
MW17B	Sep-94		0.0001 U	0.0002 U	0.0001 U	0.0002 U	0.01	NA
MW17B	Feb-95		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	0.01 U
<i>Deep Well</i>								
MW13B-1	Sep-91		0.012 U	0.025	0.0001 U	0.009	0.0092	0.006 U
MW13B-2	Jan-92		0.021 U	0.033	0.0001	0.011	0.0128	0.006 U
MW13B-3	Apr-92		0.026 U	0.042 J	0.0002	0.014	0.0103	0.006 U
MW13BX-3	Apr-92		0.021 U	0.037	0.0001	0.012	0.0136	0.006 U
MW13B-4	Jul-92		0.011	0.021	0.0001 U	0.009	0.0085	0.006 U
MW13B-5	Oct-92		0.013	0.023	0.0001 U	0.0075	NA	NA
MW13B-6	Jan-93		0.019	0.028	0.0001 U	0.012	NA	NA
MW13B-7	Apr-93		0.017	0.028	0.0001 U	0.011	NA	NA
MW13B-8	Jul-93		0.018	0.029	0.00019	0.013	NA	NA
MW13B	Sep-94		0.009	0.015	0.0001 U	0.004	0.017	NA
MW13B	Feb-95		0.012	0.017	0.0001 U	0.008	NA	0.01 U

TABLE 1



## Round 2

February 1995 Biannual Groundwater Monitoring  
& Historical Quarterly Volatile Organic Compound & Chromium Results  
BPA Ross Complex

Concentrations expressed in mg/l.			volatile organics				Metals	
			chloroform	1,1,1-trichloroethane	1,1-dichloroethane	1,1-dichloroethene	total chromium	dissolved chromium
MCL			0.1	0.2	NE	0.007	0.1	0.1
MTCA Method B			0.007	0.72	NE	0.00007	0.08	0.08
WA State Ground Water Qual. Criteria			0.007	0.2	0.001	NE	0.05	0.05
Deep Well								
MW14B-1	Sep-91		0.0006 U	0.003	0.0001 U	0.0009	0.006 UJ	0.006 UJ
MW14B-2	Jan-92		0.0005 U	0.002	0.0001 U	0.0005	0.0085	0.006 U
MW14B-3	Apr-92		0.001 U	0.002	0.0001 U	0.0007	0.0079	0.006 U
MW14B-4	Jul-92		0.0004 U	0.001	0.0001 U	0.0006	0.0075	0.006 U
MW14BX-4	Jul-92		0.0004 U	0.002	0.0001 U	0.0007	0.0102	0.006 U
MW14B-5	Oct-92		0.00046	0.0021	0.0001 U	0.0008	NA	NA
MW14B-6	Jan-93		0.00049	0.0019	0.0001 U	0.0011	NA	NA
MW14B-7	Apr-93		0.00079	0.0029	0.0001 U	0.00091	NA	NA
MW14B-8	Jul-93		0.0011	0.003	0.0001 U	0.00099	NA	NA
MW14B	Sep-94		0.0005	0.002	0.0001 U	0.0008	0.01 U	NA
MW14B	Feb-95		0.0001 U	0.001	0.0001 U	0.0002 U	NA	0.01 U
Deep Well								
MW16B-1	Sep-91		0.01 U	0.014	0.0001 U	0.003	0.0095	0.006 U
MW16B-2	Jan-92		0.009 U	0.016	0.0001	0.003	0.006 U	0.006 U
MW16B-3	Apr-92		0.014 U	0.018	0.0001	0.005	0.006 U	0.006 U
MW16B-4	Jul-92		0.007	0.011	0.0001 U	0.003	0.006 U	0.006 U
MW16B-5	Oct-92		0.0092	0.015	0.0001 U	0.004	NA	NA
MW16B-6	Jan-93		0.011	0.017	0.0001 U	0.0047	NA	NA
MW16B-7	Apr-93		0.013	0.019	0.00015	0.0054	NA	NA
MW16B-8	Jul-93		0.011	0.015	0.00012	0.005	NA	NA
MW16B	Sep-94		0.006	0.01	0.0001	0.004	0.01 U	NA
MW16B	Feb-95		0.008	0.012	0.0001 U	0.004	NA	0.01 U
Deep Well								
MW24B-4	Jul-92		0.0001 U	0.0003	0.0001 U	0.0002 U	4.38	0.006 U
MW24B-5	Oct-92		0.0001 U	0.00086	0.0001 U	0.0002 U	NA	NA
MW24B-6	Jan-93		0.0001 U	0.00076	0.0001 U	0.0002 U	NA	NA
MW24B	Sep-94		0.0001	0.0005	0.0001 U	0.0002 U	0.6	NA
MW24B	Feb-95		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	0.01 U
Deep Well								
MW29B-4	Jul-92		0.0001 U	0.0001 J	0.0001 U	0.0002 U	0.0065 J	0.006 UJ
MW29B-5	Oct-92		0.0002 J	0.0018 J	0.0001 U	0.0002 U	NA	NA
MW29B-6	Jan-93		0.0001 U	0.0013	0.0001 U	0.0002 U	NA	NA
MW29B	Sep-94		0.0001	0.0002	0.0001 U	0.0002 U	0.021	NA
MW29B	Feb-95		0.0001 U	0.0002 U	0.0001 U	0.0002 U	NA	0.01 U

## Notes :

J - The associated value is an estimated quantity.

NA - Not analyzed.

NE - Not established.

P - Proposed MCL.

R - The data are unusable (compound may or may not be present). Resampling and reanalysis is necessary for

U - The material was analyzed for, but was not detected above the level of the associated value.

The associated value is either the sample quantitation limit or the sample detection limit.

UJ - The material was analyzed for, but was not detected. The associated detection limit is an estimated quality.

\* - 1,1,1-trichloroethane was found in laboratory method blank, result is suspect.



## 6. *Certification That Remedy Is Operational and Functional*

The ROD has been successfully implemented in that the Fog Chamber Dump cap is in place and fully operational. Under the continued groundwater monitoring program, two sampling and analysis events have already taken place and show groundwater conditions to be stable.

## 7. *Operation and Maintenance Plan*

Once in place the Fog Chamber Dump cap is fully operational and requires little maintenance. A series of seven clean outs were installed in the peripheral drainage system surrounding the cap. These will be inspected annually and cleaned as necessary by site management personnel.

## 8. *Summary of Project Costs*

A summary of the project costs through February 1995, including all construction and monitoring costs, are provided below.

### **Fog Chamber Cap**

Design Costs	\$ 20,00.00
Preliminary Construction	\$ 22,000.00
Actual Construction/Installation costs	\$170,000.00
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Total Cost for Cap	\$212,000.00

### **Groundwater Monitoring**

Fieldwork	\$ 8,000.00
Lab Analysis/Report	\$ 4,000.00
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Total Costs	\$ 12,000.00 per year --

The funding for these activities was paid for by the Bonneville Power Administration out of its revenues derived from rates. No appropriated funds were involved.